

Title (en)  
ATOMIC FORCE MICROSCOPY PROBE

Title (de)  
RASTERKRAFTMIKROSKOPIESONDE

Title (fr)  
SONDE POUR MICROSCOPIE A FORCE ATOMIQUE

Publication  
**EP 2150799 A1 20100210 (FR)**

Application  
**EP 08805499 A 20080423**

Priority  
• FR 2008000580 W 20080423  
• FR 0703161 A 20070502

Abstract (en)  
[origin: WO2008148951A1] The invention relates to an atomic force microscopy probe (SM) including a micromechanical resonator (RMM) and a tip for atomic force microscopy (P1) protruding from said resonator, characterised in that it also comprises a means (EL1) for selectively exciting an oscillation mode of the volume of said resonator (RMM), and in that said tip for atomic force microscopy (P1, P1') protrudes from said resonator substantially in correspondence with a ventral point (PV1) of said volume oscillation mode. The invention also relates to an atomic force microscope including such a probe (SM'), and to an atomic force microscopy method involving the use of such a probe.

IPC 1-7  
**G01N 13/16; G12B 21/08**

IPC 8 full level  
**G01Q 20/04** (2010.01); **G01Q 30/12** (2010.01); **G01Q 60/32** (2010.01); **G01Q 60/38** (2010.01)

CPC (source: EP US)  
**B82Y 35/00** (2013.01 - US); **G01Q 20/04** (2013.01 - EP US); **G01Q 30/12** (2013.01 - EP US); **G01Q 60/32** (2013.01 - EP US); **G01Q 60/38** (2013.01 - EP US)

Citation (search report)  
See references of WO 2008148951A1

Citation (examination)  
• US 2002092982 A1 20020718 - JHE WON HO [KR], et al  
• JING WANG ET AL: "1.156-GHz self-aligned vibrating micromechanical disk resonator", IEEE TRANSACTIONS ON ULTRASONICS, FERROELECTRICS AND FREQUENCY CONTROL, IEEE, US, vol. 51, no. 12, 1 December 2004 (2004-12-01), pages 1607 - 1628, XP011368782, ISSN: 0885-3010, DOI: 10.1109/TUFFC.2004.1386679  
• YUAN XIE ET AL: "UHF Micromechanical Extensional WineGlass Mode Ring Resonators", ELECTRON DEVICES MEETING, 2003. IEDM '03 TECHNICAL DIGEST. IEEE INTERNATIONAL, 3 March 2004 (2004-03-03), XP055367192  
• AYAZI F ET AL: "VHF Single-Crystal Silicon Elliptic Bulk-Mode Capacitive Disk Resonators-Part I: Design and Modeling", JOURNAL OF MICROELECTROMECHANICAL SYSTEMS, IEEE SERVICE CENTER, US, vol. 13, no. 6, 1 December 2004 (2004-12-01), pages 1043 - 1053, XP011123040, ISSN: 1057-7157, DOI: 10.1109/JMEMS.2004.838387  
• CHANDORKAR S A ET AL: "Limits of quality factor in bulk-mode micromechanical resonators", IEEE 21ST INTERNATIONAL CONFERENCE ON MICRO ELECTRO MECHANICAL SYSTEMS, 2008 : MEMS 2008 ; 13 - 17 JAN. 2008, TUCSON, ARIZONA, USA, PISCATAWAY, NJ : IEEE OPERATIONS CENTER, 1 January 2008 (2008-01-01), pages 74 - 77, XP031210686, ISBN: 978-1-4244-1792-6, DOI: 10.1109/MEMSYS.2008.4443596  
• T-C NGUYEN C ED - KINNICK R R ET AL: "6l-4 Integrated Micromechanical Circuits Fueled By Vibrating RF MEMS Technology (Invited)", ULTRASONICS SYMPOSIUM, 2006. IEEE, IEEE, PI, 1 October 2006 (2006-10-01), pages 957 - 966, XP031076428, ISBN: 978-1-4244-0201-4, DOI: 10.1109/ULTSYM.2006.224  
• LI-WEN HUNG ET AL: "UHF Micromechanical Compound-(2,4) Mode Ring Resonators With Solid-Gap Transducers", FREQUENCY CONTROL SYMPOSIUM, 2007 JOINT WITH THE 21ST EUROPEAN FREQUENCY AND TIME FORUM. IEEE INTERNATIONAL, IEEE, PI, 1 May 2007 (2007-05-01), pages 1370 - 1375, XP031138190, ISBN: 978-1-4244-0646-3  
• KUN WANG ET AL: "High-order medium frequency micromechanical electronic filters", JOURNAL OF MICROELECTROMECHANICAL SYSTEMS., vol. 8, no. 4, 1 December 1999 (1999-12-01), US, pages 534 - 556, XP055367365, ISSN: 1057-7157, DOI: 10.1109/84.809070  
• J.R. CLARK ET AL: "High-Q UHF micromechanical radial-contour mode disk resonators", JOURNAL OF MICROELECTROMECHANICAL SYSTEMS., vol. 14, no. 6, 1 December 2005 (2005-12-01), US, pages 1298 - 1310, XP055367104, ISSN: 1057-7157, DOI: 10.1109/JMEMS.2005.856675  
• YU-WEI LIN ET AL: "Series-resonant VHF micromechanical resonator reference oscillators", IEEE JOURNAL OF SOLID-STATE CIRCUITS., vol. 39, no. 12, 1 December 2004 (2004-12-01), PISCATAWAY, NJ, USA, pages 2477 - 2491, XP055367078, ISSN: 0018-9200, DOI: 10.1109/JSSC.2004.837086  
• PAI P ET AL: "MEMS-based hemispherical resonator gyroscopes", 2013 IEEE SENSORS, IEEE, 28 October 2012 (2012-10-28), pages 1 - 4, XP032308798, ISSN: 1930-0395, DOI: 10.1109/ICSENS.2012.6411346  
• ANONYMOUS: "Fibre neutre - Wikipédia", 27 December 2013 (2013-12-27), XP055428460, Retrieved from the Internet <URL:https://fr.wikipedia.org/wiki/Fibre\_neutre> [retrieved on 20171124]

Designated contracting state (EPC)  
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR

Designated extension state (EPC)  
AL BA MK RS

DOCDB simple family (publication)  
**FR 2915803 A1 20081107; FR 2915803 B1 20120608**; EP 2150799 A1 20100210; JP 2010526284 A 20100729; JP 5208201 B2 20130612; US 2010205698 A1 20100812; US 8091143 B2 20120103; WO 2008148951 A1 20081211

DOCDB simple family (application)  
**FR 0703161 A 20070502**; EP 08805499 A 20080423; FR 2008000580 W 20080423; JP 2010504785 A 20080423; US 59849008 A 20080423